ASIAN DEVELOPMENT BANK **PPA: PHI 24028**

PROJECT PERFORMANCE AUDIT REPORT

ON THE

SECOND ISLAND PROVINCES RURAL WATER SUPPLY SECTOR PROJECT (Loan 1052-PHI[SF])

IN

THE PHILIPPINES

December 1999

CURRENCY EQUIVALENTS

Currency Unit – Peso (₱)

		At Appraisal (October 1990)	At Project Completion (February 1996)	At Operations Evaluation (May 1999)
₱1.00	=	$0.039	$0.382	$0.026
$1.00	=	₱25.750	₱ 26.150	₱ 37.910

ABBREVIATIONS

ADB	–	Asian Development Bank
BWSA	–	Barangay Waterworks and Sanitation Association
DEO	–	district engineer's office
DOH	–	Department of Health
DPWH	–	Department of Public Works and Highways
DILG	–	Department of Interior and Local Government
EIRR	–	economic internal rate of return
LGU	–	local government unit
O&M	–	operation and maintenance
PCR	–	project completion report
PPAR	–	project performance audit report
RWSSP	–	Rural Water Supply and Sanitation Sector Project
SARAR	–	self-esteem, associative strength, resourcefulness, action planning, responsibility
SDR	–	special drawing right
TA	–	technical assistance

WEIGHTS AND MEASURES

m^3	–	cubic meter
l	–	liter
m	–	meter
mg	–	milligram

NOTES

(i) The fiscal year (FY) of the Government ends on 31 December.
(ii) In this report, "$" refers to US dollars.

Operations Evaluation Office, PE-536

CONTENTS

BASIC DATA
PROJECT PREPARATION/INSTITUTION BUILDING

TA No.	TA Project Name	Type	Person-Months	Amount	Approval Date
1422	Training System for Rural Water Supply Personnel	A&O	15	$130,000	20 November 1990

KEY PROJECT DATA ($ million)	As Per ADB Loan Documents	Actual
Total Project Cost	31.30	26.50
Foreign Exchange Cost	20.80	15.12
Local Currency Cost	10.50	11.38
ADB Loan Amount/Utilization[a]	24.00	17.27
ADB Loan Amount/Cancellation[a]		6.59

KEY DATES	Expected	Actual
Appraisal		19 July-2 August 1990
Loan Negotiations		16-17 November 1990
Board Approval		20 November 1990
Loan Agreement		22 November 1990
Loan Effectiveness	20 February 1991	18 February 1991
Project Completion	30 June 1994	31 December 1995
Loan Closing	31 December 1994	19 February 1996
Months (Effectiveness to Completion)	40	58

KEY PERFORMANCE INDICATORS (%)	Spring Development	Deep Well	**Shallow Well**
Economic Internal Rate of Return[b]			
PPAR	16	negative	negative
Financial Internal Rate of Return[c]			
PPAR	negative	negative	negative
PCR	3-5	3	5-18

BORROWER	Republic of the Philippines
EXECUTING AGENCY	Department of Public Works and Highways

MISSION DATA

Type of Mission	Missions	Person-Days
Appraisal	1	52
Project Administration		
Review[d]	5	60
Project Completion	1	46
Operations Evaluation	1	30

A&O = advisory and operational, ADB = Asian Development Bank, PCR = project completion report, PPAR = project performance audit report, TA = technical assistance

[a] ADB approved a loan amounting to SDR16.727 million, which was equivalent to $24 million at the time of approval. Of this, a total of SDR12.224 million (equivalent to $17.267 million) was disbursed, with SDR4.503 million ($6.585 million) canceled at the time of loan closing.

[b] not calculated in the Appraisal Report and PCR

[c] not calculated in the Appraisal Report

[d] The first review mission (29 August-4 September 1991) was undertaken in conjunction with the review of Loan 812-PHI: *Island Provinces Rural Water Supply Sector Project*, for $24 million, approved on 4 December 1986.

EXECUTIVE SUMMARY

The Project[1] was the second for the Asian Development Bank (ADB) to support the Government's rural water supply sector development program (a continuation of the *Island Provinces Rural Water Supply Sector Project*,[2] which was completed in 1992, evaluated in 1995, and rated partly successful). ADB approved a sector loan amounting to $24 million equivalent on 20 November 1990. The main objective of the Project was to provide safe and easily accessible drinking water to about 180 rural municipalities in the same 15 island provinces targeted under the first project. The Project was accompanied by an advisory technical assistance (TA)[3] to strengthen the technical capabilities of the Executing Agency, the Department of Public Works and Highways (DPWH), and local government units.

This evaluation was a pilot attempt to use participatory evaluation techniques involving stakeholders, including project beneficiaries, members of *Barangay*[4] Waterworks and Sanitation Associations (BWSAs), DPWH officials, local government unit representatives, and workers from the Department of Health. The Operations Evaluation Mission also surveyed a random sample of 92 project facilities.

The Project constructed about 8,000 point source systems and rehabilitated 800 existing point source systems, with the total number of facilities constructed exceeding the appraisal target by 5 percent. The Project also provided equipment for hydrogeological investigation, drilling, and water quality analysis, as well as other tools.

The technical designs for the construction and rehabilitation of the point source systems were simple and generally appropriate. Considering the simpleness of the structures, the construction quality was not satisfactory in some cases, improper platforms and drainage at several sites. There were sites where the drilling (originally intended for installing pumps) hit aquifers, and no collecting tanks were built above ground, leading to a perennial water wastage. The hydrogeological assessments in selecting of sites for the project facilities were generally based on on-site interviews with the community. Moreover, the Project could not anticipate the widespread pollution of shallow groundwater through the proliferation of septic tanks (which were not built under the Project).

Project implementation was partly satisfactory. Despite this being DPWH's second project, the Project suffered from long delays in recruiting domestic consultants, releasing local funds for construction, and procuring equipment and materials.

The TA (footnote 3) provided by the Project was not very successful as the officials of DPWH and the district engineer's offices trained under the TA did not fully use their new skills. The officers from the Department of Interior and Local Government and the project beneficiaries in the BWSAs—who needed these skills—could not attend the training. The poor cooperation between the Department of Interior and Local Government and DPWH contributed to delays in forming and institutionalizing the BWSAs. More assistance was needed under the Project for forming BWSAs. Moreover, Department of Health's lack of systematic testing and monitoring of water quality exacerbated the situation, resulting in nonutilization of poorly operating facilities.

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[1] Loan 1052-PHI (SF): *Second Island Provinces Rural Water Supply Sector Project*, for $24 million, approved on 20 November 1990.

[2] Loan 812-PHI: *Island Provinces Rural Water Supply Sector Project*, for $24 million, approved on 4 December 1986.

[3] TA 1422-PHI: *Training System for Rural Water Supply Personnel*, for $130,000, approved on 20 November 1990.

[4] Neighborhood

The overall performance of the project facilities was partly satisfactory. In several instances, shallow wells went dry during the dry season. Taking into account seasonal variation of water availability, deeper wells should have been considered.

The water quality was unacceptable for drinking in almost all facilities. Chemical testing for coliform and other bacteria was not regularly conducted in many facilities. The BWSAs did not operate efficiently: they did not collect tariffs regularly; they could not handle major repairs in the shallow pumps; and they did not have adequate training or skills to manage systems that included public standpipes and private taps. The Project contributed marginally to improving the institutional capabilities of BWSAs. The economic reevaluation revealed that the benefits generated from spring development justified the investment, while the benefits from the shallow well and deep well facilities did not. The financial performance of the BWSAs was poor and the financial internal rates of return were negative. The environmental impact of the project facilities is minimal. However, the shallow groundwater was polluted by septic tanks (not funded under the Project), which affected the water quality in the project facilities. The sustainability of the facilities is currently unlikely as the BWSAs are not sufficiently organized—both technically and financially.

At the participatory evaluation workshops for stakeholders, the Mission provided immediate solutions for rehabilitating the nonoperating facilities. The Government is advised to (i) urgently rehabilitate works before building new facilities; and (ii) train the BWSAs on water quality testing, basic water treatment, and hygiene. For future projects, the siting and type of facility for a location should be decided after rigorous analysis of groundwater and surface water availability, water quality, and sociocultural acceptability.

ADB should require DPWH to undertake periodic maintenance in similar cases where the community-based users groups cannot. There should be an operation and maintenance and rehabilitation component in future projects, which could be a sector allocation where the executing agency is delegated the responsibility of choosing appropriate facilities to be repaired. ADB should review sanitation facilities concomitantly and should assist the Government in preparing and implementing medium- and long-term plans for disposal of human waste.

On 7 October 1999, ADB's Projects Division and the Government (DPWH; the Department of Interior and Local Government; and the Department of Health) adopted an action plan (proposed by the Mission) for rehabilitating the facilities and strengthening the BWSAs. The Mission considered the Project's sustainability as likely after these actions are substantially completed. Acknowledging the commitment of ADB's Projects Division and the Government to implement the action plan, the Project is rated partly successful.

I. BACKGROUND

A. Rationale

1. In December 1986, the Asian Development Bank (ADB) approved a sector loan of $24 million to finance the first *Island Provinces Rural Water Supply Sector Project*[1] to support the Government's water supply, sewerage, and sanitation master plan for 1988-2000. The first project, which was completed in 1992, was rated as partly successful when it was evaluated in 1995.[2] To ensure the success of the master plan, the Government requested in February 1990 a follow-on project that targeted the same 15 island provinces as the first project.

B. Formulation

2. In response to the Government's request for further ADB financing, a Fact-Finding Mission of June 1990 evaluated and reviewed the project proposal. The Project was prepared as a sector loan to finance a defined area and a specific time period (1991-1994) of the Government's water supply development program. ADB appraised the Project in July-August 1990 and approved on 20 November 1990 a loan amounting to $24 million equivalent from ADB's Special Funds resources. The Department of Public Works and Highways (DPWH) was the Executing Agency. The Project was accompanied by an advisory technical assistance (TA)[3] aimed at strengthening the technical capabilities of DPWH and local government units (LGUs) personnel, who were to be involved in the construction, and operation and maintenance (O&M) of rural water supply systems.

C. Objectives and Scope at Appraisal

3. The major objective of the Project was to provide safe and easily accessible drinking water to about 180 rural municipalities in 15 selected island provinces (see Map, page v). Focus was to be given to areas where (i) households served by the existing water supply systems were still relatively few, and (ii) water supply facilities had not been developed. This objective was to be achieved through the (i) development of 7,800 point source systems,[4] including the construction of 4,000 shallow wells, 3,000 deep wells, and 300 spring development facilities; and (ii) rehabilitation of 500 existing point source systems. In addition, other major components of the Project included (i) provision of equipment such as for hydrogeological investigation, water quality analysis, setting up of basic workshops, drilling machines, service trucks, and other tools; and (ii) consulting services for project implementation.

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[1] Loan 812-PHI: *Island Provinces Rural Water Supply Sector Project*, for $24 million, approved on 4 December 1986.

[2] Roughly one third of the facilities were considered generally successful; another one third partly successful; and the remaining one third, unsuccessful.

[3] TA 1422-PHI: *Training System for Rural Water Supply Personnel*, for $130,000, approved on 20 November 1990.

[4] These rural systems are technically defined in the Philippines as level I systems consisting of point source systems with public standpipes and no household connections. In urban areas, level II and level III systems are used. Level II systems have a mix of public standpipes and household connections. For level III systems, all or most of the households are connected to piped systems.

D. Financing Arrangements

4. The loan was sourced from ADB's Special Funds resources, with an expected closing date of 31 December 1994. At appraisal, the total project cost estimate was $31.3 million equivalent, comprising $20.8 million in foreign exchange and $10.5 million in local currency. This included $13.8 million equivalent for civil works and $14.8 million equivalent for equipment and materials. ADB was to finance the entire foreign exchange cost plus $3.2 million in local currency costs (77 percent of the total project cost). The loan was repayable over 35 years, including a grace period of 10 years. The Borrower was the Republic of the Philippines.

E. Completion

5. The loan was actually closed on 19 February 1996 after an extension of the closing date to facilitate the use of surplus loan funds of about $6.6 million equivalent for the (i) procurement of additional equipment and materials, and (ii) construction of additional level I systems. However, the surplus loan amount was eventually canceled due to delays in processing the procurements.

6. The project completion report (PCR) was prepared by ADB's Water Supply, Urban Development, and Housing Division East (AEWU) and circulated to the Board in December 1997. The PCR stated that project completion was delayed by about 1.5 years due to the slow processing of the procurement of the items related to the additional project scope. Total project costs were below appraisal estimates by about 15 percent. This underrun was attributed to (i) an overestimated cost for equipment and materials, and (ii) fluctuations in foreign exchange. Overall, the Project was rated as generally successful at completion. The total number of subprojects constructed exceeded the original target by 5 percent. Potable water facilities were available to about 330,000 households with an estimated population of about 2 million. A socioeconomic survey covering 6 percent (507 facilities) reported that 99 percent of the facilities were fully operational and that the *Barangay*[5] Waterworks and Sanitation Associations (BWSAs) were established for about 75 percent of the project facilities to provide O&M. Where BWSAs were not organized, barangay councils assumed O&M responsibilities. The sustainability of project benefits was considered essentially sound. However, other details and supporting information from the survey were not provided in the PCR. The Government had developed programs for the institutionalization of BWSAs. The Department of Health (DOH) had ongoing programs to improve systematic testing and monitoring of water quality. While shortfalls in the O&M arrangements existed, these were considered relatively minor by the Project Completion Review Mission and remedial measures were taken or developed to correct the problems.

7. The PCR made several important recommendations on the (i) formation and strengthening of BWSAs, (ii) collection of water tariffs, and (iii) water quality testing, and suggested that ADB carefully monitor the implementation of these recommendations in conjunction with the ongoing Rural Water Supply and Sanitation Sector Project (RWSSP).[6] The PCR did not estimate the economic internal rate of return (EIRR) because the "without-Project" consumption was mainly from dug wells, which were free to the communities.

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[5] Neighborhood

[6] Loans 1440-PHI and 1441-PHI(SF): *Rural Water Supply and Sanitation Sector Project*, for $37 million, approved on 4 June 1996.

F. Operations Evaluation

8. This project performance audit report (PPAR) is based on the findings of the Operations Evaluation Mission, which met with officials from DPWH's central and regional offices and LGUs, visited subprojects, and interviewed project beneficiaries in three provinces during 5-10 May 1999. In April 1999, the Mission conducted a survey to assess the impact of the subprojects on the beneficiaries. The survey covered 92 sites in the provinces of Guimaras, Marinduque, Negros Occidental, and Romblon, including Bacolod City, Negros Oriental, and Siquijor.[7] Other sites in the southern provinces could not be visited for various reasons: remote locations, security concerns, and time constraints. Chemical, physical, and bacteriological analyses were conducted on water samples from ten sites. The Mission conducted two workshops on participatory evaluation of the Project. The first workshop in Bacolod City on 10 May 1999, was attended by 35 participants, including BWSA officers and members, community water users, DOH officials, DPWH water supply engineers and training officers, well driller supervisors, and LGU officials from beneficiary barangays in Bacolod City, Guimaras, Negros Occidental, and Negros Oriental. The second workshop on 14 May 1999 at ADB's headquarters, jointly organized with ADB's AEWU, was attended by project implementation officers and stakeholders in the RWSSP and project beneficiaries from the provinces of Basilan, Batanes, Camiguin, Marinduque, Quezon (Polillo and Alabat Islands), Romblon, Sulu, and Tawi Tawi, who provided insights from their experiences. The pilot attempt at using participatory evaluation employing the self-esteem, associative strength, resourcefulness, action planning, and responsibility (SARAR) technique[8] was successful to confirm the findings from the field surveys on the developmental impact and to deduce useful lessons from the Project (Appendix 1). The PPAR is also based on a review of the PCR, report and recommendation of the President, appraisal report, and materials in ADB files; and discussions with beneficiaries and staff of ADB, DPWH, and other agencies of the Borrower. Copies of the draft PPAR were provided to the Borrower, DPWH, and ADB departments for review and comments. Comments received were considered in finalizing the PPAR.

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[7] The sample size was estimated using Tsebychev's Inequality. Given the total of 8,205 facilities, for a margin of error of 10 percent, the survey required 100 samples. The number of samples in each province was prorated according to the respective number of facilities constructed.

[8] The SARAR technique is an efficient tool to elicit solutions by active interaction among stakeholders.

II. IMPLEMENTATION PERFORMANCE

A. Design

9. The Project was in consonance with the Government's long-term water supply and sanitation policy and master plan. The objective and scope of the Project were in line with the Government's policies to deliver drinking water to the target populations. Creating of the BWSAs through the Project was a positive contribution necessitating community participation in and ownership of the project facilities. The technical approach for expanding of the facilities to level II and III systems, and for developing spring was appropriate to meet the requirements of the communities. However, the Mission observed that the Project could not anticipate the widespread pollution of shallow groundwater through the proliferation of septic tanks.

10. DPWH and the district engineer's offices (DEOs) generally used published National Water Resources Board hydrogeological maps in evaluating intended sites for each type of facility. DPWH also relied more on getting on-site assessments of groundwater potential by interviewing community members rather than by using geophysical instruments and correlating the findings to existing regional data.[1] In several instances, shallow wells went dry during the dry season. This could be seen as deficient technical planning as a deeper well would have been more appropriate, to eliminate seasonal variation.

B. Contracting, Construction, and Commissioning

11. The Mission concurred with the PCR's assessment that the consultants' performance was not fully satisfactory. The performance of DEOs in construction was partly satisfactory. Except for development of springs, which was done through civil works contracts, the DEOs constructed other facilities using local contract labor. The DEOs provided the materials and equipment, and supervised the work. While this may have saved on the unit cost of construction, the quality of construction was unsatisfactory.

12. Of 11 overhead tanks, the Mission observed 3 to be poorly constructed. The installation of hand pumps was generally satisfactorily. However, the platform and drainage around the hand pumps were either missing or not properly constructed according to standard design. There were three sites where the drilling (originally intended for installing pumps) hit confined aquifers, and the aboveground structures were perennially leaking taps. Proper collecting tanks or gate valves should have been designed and constructed for these cases. The procurement generally followed ADB's *Guidelines for Procurement*. However, due to the bulk procurement, a significant quantity of the chemicals for water quality analysis expired before they could be used. In addition, long delays in procurement resulted in the cancellation of surplus funds (paras. 17 and 18).

13. The Project suffered from allegations of corruption by persons from DPWH. A report indicated a shortage of about ₱44 million of materials delivered (PCR, para. 15). Criminal

[1] Despite the availability of trained hydrogeologists, there was no rigorous assessment. The reason cited was lack of continuity of trained personnel in their positions, due to difficulties in keeping these personnel in the DEOs. Furthermore, these functions have been devolved to the LGUs, which do not have such trained personnel.

charges were filed after the Commission on Audit released a report on 1 April 1997. Subsequently, strict measures for auditing of materials were introduced.

C. Organization and Management

14. DPWH, through its regional directors' offices, assigned the responsibility for implementation to the DEOs. The project management committee, with seven members, was responsible for the planning, execution, and overall supervision of the Project.

15. The Department of Interior and Local Government (DILG) did not assign, as agreed at appraisal, institutional development coordinators to assist the DEOs during field implementation. Consequently, each of the 21 DEOs hired a training officer for institutional development.

16. However, the Mission observed that in effect, the training was carried out by DPWH staff, usually water supply engineers. The Mission also identified that the poor cooperation or involvement of DILG and its LGUs contributed to delays in forming and institutionalizing the BWSAs. Moreover, DOH's lack of systematic testing and monitoring of water quality resulted in poor operation of facilities.

D. Implementation Schedule

17. The Project suffered from long delays in recruiting the domestic consultants (PCR, para. 12) due to disputes during contract negotiations. Other delays occurred in the release of local funds for construction and in the procurement of equipment and materials (PCR, para. 13). The Mission observed that lessons from the first project were not incorporated in the Project to avoid delays. Delays in start up and completion of various activities in the first project were similarly experienced in the Project's implementation. Appendix 2 provides the implementation schedules for the first project and the Project.

E. Actual Cost and Financing

18. The total project cost at completion was $26.5 million equivalent compared with the appraisal estimate of $31.3 million equivalent. The PCR acknowledged the overestimation of cost for equipment and materials. ADB approved the use of surplus loan funds of about $6.6 million for the procurement of additional equipment and materials and construction of additional level I systems. Due to protracted delays, the surplus funds were canceled at loan closing. In addition, analysis revealed that the expenses for institutional and administrative support were high: 5 percent of the total cost, or twice the amount envisaged at appraisal, and three times the amount incurred under the first project (Appendix 3).

19. Savings were substantial in equipment cost (actual cost was 40 percent lower than the corresponding appraisal estimate), and consulting services (actual cost was 26 percent lower than the corresponding appraisal estimate). In hindsight, considering that 30 percent of the facilities commissioned under the first project were not operating (PPAR, PE-441),[2] the Project should have included a rehabilitation component to repair such facilities. In fact, the Mission observed that such repair is necessary even for facilities built under the Project (para. 70 [vii]).

[2] PPA: PHI 18004: *Island Provinces Rural Water Supply Sector Project*, May 1995.

Moreover, the substantial savings should have been diverted to finance the repair of existing facilities instead of to build new ones.

F. Technical Assistance

20. No TA was provided to prepare the Project. However, the Project was accompanied by a TA (footnote 3) to strengthen the capabilities of DPWH and the LGUs.[3] The training was delivered through the DEOs using material provided by the TA consultants. The major topics covered were (i) groundwater resource evaluation; (ii) well drilling; (iii) installation and O&M of pumps; and (iv) physical, chemical, and bacteriological analyses of water (including techniques for removing iron and manganese). DPWH and LGU personnel believed these techniques were appropriate. However, the TA was not very effective as the training was conducted with no proper coordination of the Government agencies. Consequently, the sessions were poorly attended. The Mission observed that DPWH and the DEOs did not fully use those trained, many of whom were transferred to other departments. There was no transfer of knowledge to the BWSA members, who actually operate the facilities. The training also did not include DILG personnel, who are executing the ongoing RWSSP (footnote 6). The TA is rated unsuccessful.

G. Compliance with Loan Covenants

21. The PCR judged the compliance with covenants as generally satisfactory. However, several key covenants relating to proper O&M of project facilities were not complied with,[4] and none of the covenants were fully complied with. The status of unmet covenants had not changed since the PCR. In addition, DPWH did not submit the benefit monitoring and evaluation reports for the facilities (Appendix 4). When DILG did not participate in the Project as a result of the National Economic and Development Authority (NEDA) Resolution, ADB should have reviewed important covenants relating to project implementation and training of the BWSAs.

[3] The PCR reported that the TA trained 60 participants, 4 from each of the 15 island provinces for about two weeks.
[4] ADB should have actively monitored compliance with the covenants and advised DPWH to improve compliance.

III. PROJECT RESULTS

A. Operational Performance

22. The Mission conducted a random survey of 92 facilities (about 1 percent of the facilities completed). Of those surveyed, 89 percent involved new construction, 1 percent involved rehabilitation of nonfunctioning deep wells, and 2 percent involved additional improvements to existing facilities. Of the newly constructed facilities that were surveyed, 71.9 percent involved deep wells, 13.5 percent involved shallow wells, 11.2 percent involved spring development, and 3.4 percent involved free-flowing wells. The operational performance was assessed on a review of the physical condition of facilities, O&M, and water quality. The Mission visited specific facilities and conducted SARAR workshops to confirm the issues, determine the lessons learned, and identify solutions for rehabilitating the nonoperating facilities.

23. The physical works included constructing shallow wells and deep wells, installing hand pumps for the wells, developing springs, and rehabilitating the wells under the first project. These works were completed and the numbers surpassed their targets for constructing deep wells and rehabilitating wells (Appendix 5). The table summarizes the operational performance of facilities based on the Mission's survey findings.

Summary of Operational Performance Survey

Item	Type of Facility			Rehabilitation[a]	Total	%
	DW	SW-FF	SD			
1. Facilities Surveyed (no.)	64 (12)[b]	15 (3)	10 (5)	3	92 (20)	—
2. Facility is Properly Working (no.)	60 (11)	10 (3)	10 (5)	2 (—)	82 (19)	89 (95)
3. Water Used for Drinking (no.)	43 (9)	5 (3)	10 (5)	2 (—)	65 (17)	70 (85)
4. Regular Testing for Water Quality (no.)	13 (1)	1 (0)	2 (2)	2	18 (3)	20 (15)
5. Average Distance from Septic Tanks (m)	71	22	2,400	30	—	—
6. Maximum Households Served (no.)	40 (59)	10 (20)	200 (500)	15 (—)	—	—
7. Average Hours of Operation/Water Availability per Day (hours)[c]	2-4	24	2-4	—	—	—
8. Seasonal Drying Up (months)[c]	2	4	0	—	—	—
9. Dominant Alternative Source	River	Open Wells	Spring Source	Open Wells		
10. Distance of Farthest Households from Facility Source (m)	1,000	300	200	400	—	—
11. Average Household Income (₱)	3,929	4,100	6,145	4,390	—	—
12. Proportion of Women Fetching Water (%)	36	45	57	33	39 (44)[d]	—
13. Regular Collection of Water User Fees	12	2	9	3	26	28 (53)[d]
14. BWSA-Operated Facility	15	1	8	2	26	28 (65)[d]

— = data not available
BWSA = *Barangay* Waterworks and Sanitation Association, DW = deep well, FF = free flow, SD = spring development, SW = shallow well
[a] includes all types of facilities
[b] PCR survey results (in parentheses) were based on 20 facilities visited.
[c] Answers for 7 and 8 are based on the Mission's interviews.
[d] Results from the PCR survey on 509 facilities.

24. Considering the simpleness of the structures, the quality of construction was not satisfactory in some cases. The Mission found the concrete overhead tanks for level II systems to be leaking through fractures in the tank bodies. The poor performance of the project implementation consultants and the lack of adequate supervision by the DEOs were the main causes.

25. The Mission found that operational performance of the facilities was not fully satisfactory. Eleven percent of the facilities surveyed were nonfunctional. Water quality was poor and had markedly deteriorated since the PCR which claimed 99 percent of the facilities were fully operational. Eight out of the ten water samples taken and analyzed by the Mission contained unacceptable levels of confirmed coliform and fecal coliform bacteria (para. 37 and Appendix 6). In 80 percent of the sites, water quality testing was not regularly carried out after the hand over of facilities.

B. Institutional Development

26. The institutional capabilities of the BWSAs improved marginally under the Project. The PCR reported that the BWSAs were successfully operating the facilities and that the community members were aware of their O&M responsibilities. However, the Mission observed that although most of the BWSAs formed at the PCR stage were still existing, their lapse in collecting tariffs from their members affected the sustainability of operations. In the absence of adequate funds through regular and disciplined tariff collection, it was not possible to do minor repairs as they were needed and, more importantly, preventive maintenance at each facility.

27. Furthermore, as a result of the Government policy to implement devolution through the Local Government Code, the BWSAs became totally responsible for the O&M of the facilities.[1] However, a majority of the BWSAs that were responsible for the O&M of these facilities did not receive any formal training (para. 20). In hindsight, the training should have been split into two parts, with (i) the technical knowledge transferred to the technical institutions (DPWH and the LGUs); and (ii) the training on O&M, methods for removing iron and sterilizing raw well water, and basic health and sanitation given to the BWSAs (recommendation in para. 70).[2]

28. Overall, further improvements are required in the capacity among BWSA members to physically operate and maintain level I facilities. For level II facilities, the communities require training and support to acquire the necessary skills to carry out satisfactory O&M. Furthermore, the Mission is concerned about their ability to collect revenue and use these funds in a financially responsible manner to efficiently operate and maintain the facilities (Appendix 1, paras. 4-6). Level III facilities warrant more skills, for the repair of items such as electrical submersible pumps, which were usually available in DPWH and similar institutions. Considering the relatively few Level III installations, the Mission feels these should be jointly operated by the

[1] Local Government Code of 1991, Section 17, clearly states that LGUs are responsible for maintaining their local water supply systems.

[2] **Similar ADB-financed projects in Sri Lanka (Loan 1235-SRI[SF]: *Second Water Supply and Sanitation Project*, for $40 million, approved on 17 June 1993 and Loan 1575-SRI(SF): *Third Water Supply and Sanitation Sector Project*, for $75 million approved on 6 November 1997 have, as integral components, regular training workshops, each lasting at least a day in every district. The trainers demonstrate to the beneficiaries in the water users associations, in a fully participatory manner, the mechanics of how the hand pumps work, how to service them, and how to repair the parts that need replacement through wear and tear together with good sanitary practices.**

BWSAs and Government departments. Overall, the Project contributed only marginally to the institutional development of the BWSAs.

29. The BWSAs do not have the technical ability to assess groundwater availability and to hire the services for drilling boreholes, which require specialized contractors (recommendation in para. 70). Further training and support would be required to improve the BWSA's institutional and technical capacity to implement future projects.

C. Financial Reevaluation

30. The financial performance of the facilities surveyed was unsatisfactory. The BWSAs were required to generate their own funds at least for the routine maintenance of the facilities, including minor outlays for regular consumables such as washers, spare parts, and any required technical services for unanticipated repairs. This arrangement overlooked that in the shallow wells, the borehole itself was most unlikely to need replacing, but the hand pump requires major maintenance and most likely be replaced after five years of operation (even with regular maintenance). When the BWSAs were made financially self-dependent, they should have been advised to collect tariffs so that adequate financial resources were created for such periodic investment. The Mission observed that the tariffs were arbitrarily fixed and were not based on levels of service. In more than 70 percent of the cases, there was no regular tariff collection to cover O&M needs. The BWSAs collected money when the facility broke down, as a sort of "crisis management." The collection of funds for recovering depreciation was therefore not even contemplated (recommendation in para. 70).

31. The Mission was informed that there was no budgetary commitment from the Government to support the facilities once they were completed and handed over to the BWSAs. The Mission concluded that the financial viability for most of the BWSAs was unlikely unless they have (i) a standing as legal and financial bodies; (ii) a secure, regular revenue base with specified rates; (iii) secure banking facilities; (iv) at least the rudiments of bookkeeping skills; and (v) accountability and answerability to their members. The financial reevaluation was not attempted as the financial internal rate of return would be negative.

D. Economic Reevaluation

32. The reevaluation was conducted following ADB's *Guidelines for Economic Analysis of Water Supply Projects*. Economic benefits were calculated in terms of savings in time spent for collecting water using the "with-Project" and "without-Project" scenarios. Such benefits were significant only where the original sources were very far from the houses. However, in the island provinces visited, where good rainfall and, as a result, adequate water was available in streams and dug wells, the benefits were less than anticipated at appraisal and at project completion. EIRRs were not calculated at appraisal or at project completion.

33. Appendix 7 provides the details of the reevaluation. As observed by the Mission, several of these facilities were not properly maintained for reasons including the (i) absence of adequate funds through regular collection of tariffs, and (ii) lack of skills. Thus, it was not possible to undertake minor repairs and, more importantly, preventive maintenance at each facility.

34. In the absence of any support to maintain and rehabilitate facilities, the possible scenario (or the base case) is the breakdown of the facilities after a few years of operation. This would

result in an EIRR of 16 percent for spring development and negative EIRRs for shallow wells and deep wells. Although the return from spring development is still relatively high, this type of facility accounted for only 4 percent of the total facilities funded by the Project. The shallow wells accounted for 47 percent of the facilities, and the deep wells accounted for 38 percent of the total. Evaluation of similar ADB-assisted projects and experience in other countries revealed that shallow well and deep well facilities should ideally be constructed and operated by communities that can afford the full costs of equipment, installation, and O&M.[3]

E. Socioeconomic and Sociocultural Results

35. The Mission conducted a socioeconomic survey of project beneficiaries at 92 locations. The objectives of the survey were to (i) determine the extent to which the Project achieved the main objective (i.e., to provide rural communities in 15 provinces with safer water), (ii) assess the extent of the Project's impact on the targeted beneficiaries, and (iii) validate the results of the survey conducted at the time of the PCR. The table presents the indicators of the development impact. The Mission also visited sites in Negros Occidental and Guimaras. The results of the survey findings are in Appendix 8. The survey confirmed the low level of developmental impact as revealed by the economic reevaluation.

36. The Mission invited stakeholders from other areas to attend the SARAR workshop held in Bacolod City. As the SARAR workshop was a participatory monitoring and evaluation forum, the discussion outputs were used by the Mission to supplement and validate the data gathered during the survey. The two workshops for participatory evaluation included case studies on spring development, shallow wells, and deep wells. The problems with each type of facility were discussed, and participants developed solutions for rehabilitating nonoperating facilities. The summary of the proceedings of the workshops is in Appendix 9.

37. With the Project, the beneficiaries could obtain water more conveniently than before. At the facilities with good water quality, the community members also enjoyed health benefits. However, the facilities in which beneficiaries used the water for drinking accounted for only 70 percent, much lower than the 85 percent reported in the PCR. The Mission tested the quality of water from ten randomly selected samples. Of these, three were subjected to detailed physical and chemical analysis. The Mission found that 8 out of 10 water samples were not potable due to high levels of coliform and fecal coliform bacteria (Appendix 6), and the three samples had high iron content (Appendix 8, para. 16).[4]

F. Gender in Development

38. Poverty alleviation was one of the expected results of this Project, as the time saved in fetching water could be used more productively. Women were expected to have more of their time made available to contribute to farm production and other paid work, child care, and other activities. Moreover, at appraisal, women were judged as a particularly disadvantaged group, and the Project aimed giving them an advantage in reducing the time and labor burdens for collecting and providing water for their households. This was fully in line with the Government's policy at the time (Appendix 8, paras. 28-30).

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[3] PPA: NEP 15064: *Rural Water Supply Sector Project*, December 1997.

[4] The participants in SARAR workshops confirmed that these observations were true for other sites as well.

39. However, the Mission's socioeconomic survey identified that such benefits were realized only in the cases where springs were developed, because the time savings, which were substantial in these cases, reliably translated into more productivity and income for the beneficiaries.

G. Environmental Impacts and Control

40. The Mission found that the quantities of water drawn from the shallow well facilities visited did not pose serious threats to depleting the shallow groundwater resources, as hand pumps are self-limiting by their very nature. Evidently, the island provinces visited by the Mission were rich in surface water and groundwater. Most crops, including much of the sugarcane are rain-fed, and there are no rain-free months. The shallow groundwater was frequently available within two meters of the surface.

41. The Mission noted the communities' skepticism and reluctance to use open dug wells, surface water sources, and supplies from open tanks. This skepticism was attributed to the communities' fear of the water being contaminated by foreign objects, as the sources were left unprotected.

42. The Mission observed that several programs (outside ADB's Project) for encouraging households to install septic tanks were being implemented in the project areas. However, the medium- to long-term programs for proper disposal of human waste were not present. The Mission noted with concern that the locations of the septic tanks in relation to the hand pump and shallow wells were not regulated, and no minimum distances were practiced. The Mission saw septic tanks being constructed and noted that many did not have sealed bottoms and that the concrete blocks used were porous. Effluent and bacterial pathogens leaking from the septic tanks into the shallow groundwater will continue to pollute the groundwater. LGUs must explore other solutions to disposing of human waste in a way that is sound for the environment (Figure 1 and Appendix 10).

43. At the project sites, on the islands where much of the population lives near the coastal belt, another significant problem emerged where submersible pumps were used to expand the deep well facilities to level II systems. Due to the nature of the salt water and fresh water balance underground near any coast, overabstraction from any well leads very rapidly to salt water intrusion in the fresh water-bearing zones. This intrusion first turns the water brackish in the shallow wells around the area. When the intrusion continues, the water becomes very salty and unfit for consumption. The intrusion can also cause land subsidence and flooding (Figure 2). The Mission observed that the Project provided many deep wells in the coastal areas where shallow wells would have sufficed and could have been more appropriate (para. 40).

44. The hand pumps did not have a brick- or cement-lined simple drain to lead the water away from the platform. These drains were covenanted to be included in the design. Simple brick-lined drains 20 meters long should be constructed at each hand pump to lead any spilled water away from the immediate site of the hand pump.

45. The Mission noted that the local communities were not aware that the upper catchments of their own sources of water, including the spring sources, must be protected to ensure long-term water availability and quality at that source. The Mission established that water output decreased in some sites due to the very dense plantations of mahogany and eucalyptus trees on the hills immediately above the springs. While protecting upper watersheds through

forestation and other measures is necessary to avoid land degradation, siltation of water courses downstream, and landslides, dense tree plantations are not advisable. Certain varieties of eucalyptus trees demand a lot of water and cause serious imbalances in water availability (Figure 3). There is a need to implement awareness programs on the interrelationship of the different components in the environment and to empower communities to take appropriate action to avoid depletion of water resources (para. 70).

FIGURES ILLUSTRATING ENVIRONMENTAL CONCERNS IN RURAL WATER SUPPLY FACILITIES

H. Gestation and Sustainability

46. The PCR reported that 19 out of 20 facilities visited were fully operational, with only 1 unused. However, the Mission observed many abandoned facilities (11 percent). Considering that the 92 sites surveyed (including 3 sites visited by the Project Completion Review Mission) were randomly chosen and those visited by the Project Completion Review Mission were selected by DPWH, the Mission is concerned about the current operational status of the Project.

47. Further analysis revealed that various reasons affected the sustainability of the facilities.[5]

48. In the shallow well facilities, the BWSAs were sufficiently organized to handle minor repairs by themselves, or they pooled money to pay for repairs. However, BWSAs did not collect money for major repairs and replacement of parts (which is needed after five years of operation).

49. In the deep well facilities, the BWSAs were poorly organized to handle the daily operation and routine maintenance. The tariffs collected was barely sufficient to pay for essentials, and the BWSAs were not well equipped to handle repairs. Many systems were abandoned (i) when the repairs cost much more than what the BWSAs collected every month, (ii) when electricity bills were unpaid, and/or (iii) when the systems went dry in the dry season.

50. In the case of the spring facilities, the Mission feels that it was inappropriate to expect BWSAs—despite the devolution—to independently handle the O&M. DEOs-DILG-DPWH should share the responsibility for several years and not merely hand over the facilities to the BWSAs. The BWSAs could be responsible only for collecting tariffs. With the existing arrangements, the facilities are not sustainable as no clear understanding on the responsibilities exists among stakeholders. The participatory evaluation addressed this problem, and stakeholders reaffirmed their individual commitment to the facilities (Appendix 11).

51. The Mission reaffirmed that the Project marginally improved community ownership, which was identified in the PPAR for the first project as the key to the sustainability of the facilities and as a prerequisite for routine O&M after the community takes over the completed facilities. The sustainability of the facilities needs to be improved.

[5] Further analysis and surveys are necessary to identify the underlying causes for some of the problems with these facilities and are proposed under the recommended action plan.

IV. KEY ISSUES FOR THE FUTURE

A. Poor Water Quality

52. Water was easily available in the island provinces. Especially in southern provinces, which the Mission visited, the groundwater level was generally shallow and many of the spring sources were untapped. However, the sustained availability of potable water is the problem. Compared with the PCR findings, the Mission found that the surveyed project facilities were operating with lesser success. As the technical designs were relatively simple and only three years had elapsed since completion, about 90 percent of the facilities were physically in good condition.

53. However, about 30 percent of the cases had nonpotable water, including some with high iron content. Some of the water produced yellow stains on clothes when washed, some had a fish-like smell and could not be used for drinking, and some had floating particles that either settled or remained afloat. In most cases, water quality was not regularly tested. In the few cases where regular testing was done, the beneficiaries were not informed of the results.

54. The Mission's water quality analysis from shallow well sources revealed that 8 out of 10 samples had unacceptable levels of coliform and fecal coliform bacteria. The Mission suspects that the water from these sources has been gradually polluted due to leakage from septic tanks in the communities. Many of these septic tanks have been built in the last five years by the communities without any supervision on their locations or designs. Although they were not part of this Project, RWSSP provided toilet bowls and cement for septic tanks. Many of these tanks do not have sealed bottoms, and none of the households reported having installed a proper two-tank system (one tank for the sludge and a second for the effluent).

B. Inadequate *Barangay* Waterworks and Sanitation Association Capacity

55. The Mission found the Project was only partly successful in organizing the BWSAs. The BWSAs were generally enthusiastic about the facilities. However, they require specific skills and technical capacity. There is a strong need for DPWH to actively assist the LGUs and the BWSAs that have been mandated to take over the facilities.

56. Many facilities were not operating due to minor technical problems that occurred after a few years of use. In some cases, minor repairs, including fixing leaking pipes, could not be done because the BWSA lacked one or more of the following: tools, skills, or funds.

57. Several facilities were abandoned due to unanticipated failures that required major repairs and rehabilitation (e.g., spare parts for submersible pumps, leaks in overhead tanks, and water treatment). Most BWSAs did not have the funds or technical skills to face these situations.

C. Sustainability of Facilities

58. Rigorous hydrogeological surveys and analyses of water availability and potential in the areas were not always done before the type of facility and the sites were selected. The Mission

feels that in these island provinces where surface water and shallow groundwater are abundant, several shallow wells at various locations could have been considered instead of deep wells. The shallow wells would be more sustainable.

59. In some cases, the BWSAs have expanded the source (usually deep wells) originally provided under the Project into a level II system. However, as BWSAs overabstracted the water beyond the natural replenishment rate underground, the water supply diminished during the dry season to the extent that beneficiaries had to schedule water usage, and even had to return to their original sources of water for supplementing their demand.[1] There were also cases where the BWSAs overabstracted water beyond the natural replenishment rate of groundwater and abstracted brackish waters, and eventually abandoned the facility.

60. These raise serious concerns about the sustainability of the Project and achievement of the original objectives. The Mission strongly feels that the rehabilitation of facilities (completed under the first project and this Project), and capacity building for the BWSAs should be addressed under the ongoing RWSSP to sustain the developmental impact.

D. Rural Water Supply and Sanitation

61. The Government correctly acknowledges the need for a holistic and long-term approach to handling rural water supply and sanitation.[2] As additional water was available with the Project, more wastewater was generated. Much of this wastewater comprises that used for flushing human waste. Several agencies have encouraged the installation of septic tanks in the rural households. However, the tanks were constructed without any supervision. There is no plan for disposing of the sludge from the septic tanks, which would incur substantial investment in O&M expenses in the future.

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[1] For facilities that went dry during the dry season, the BWSAs would have to either collect fees for buying water (or for fetching from other sources) or operate the facility only when water is available and leave it to the individuals to get water from other sources during the dry season.

[2] DPWH has initiated the preparation of the *Rural Water Supply Master Plan* (1986-2000), in each of the provinces, in cooperation with the National Economic and Development Authority.

V. CONCLUSIONS

A. Overall Assessment

62. The Project, which followed the *Island Provinces Rural Water Supply Sector Project* (footnote 1), aimed to provide easy access to safe drinking water for 1.1 million people in rural communities in 15 island provinces. The actual number of project beneficiaries is estimated at 2 million (PCR, para. 35). The Project started more than one year later than planned due to long delays in the evaluation of proposals for consultancy services. These delays continued until the final approval of the contract. The construction targets, except for shallow wells, were essentially met, and other targets were exceeded. At loan closing, a substantial portion of the loan ($6.6 million) was undisbursed and canceled. The Project's main objective of providing safe drinking water was not fully achieved. Site selection was not always based on objective criteria, including technical considerations. The water from eight out of ten facilities tested was unfit for drinking. The Mission observed poor quality construction in level II systems, including leaking overhead tanks, indicating a lack of quality control during construction. The economic reevaluation revealed that the Project's overall developmental impact was not satisfactory. The survey revealed that the BWSAs operated only 26 percent of the facilities. Sustained operation of the facilities is a concern due to the widespread lack of a disciplined approach to regular tariff collection for O&M. The Project's financial internal rate of return is negative.

63. Some deep wells went dry during the dry season. Water quality was not being tested regularly. There were also several cases where communities did not use the facilities as there were no established mechanisms for the different institutions involved to cooperate with and to provide effective backup for the BWSAs. Overall, the Project is rated as partly successful (para. 72).

64. With the Project providing increased quantities of water to communities, larger volumes of wastewater are being produced. Of particular concern is the environmental and health impact of the huge increase in the rural households using water-based removal of human waste through septic tanks. As shallow groundwater is the main source of drinking water for these communities, long-term programs are required to remedy this situation.

B. Lessons Learned

65. Simple community-level treatment solutions to improve water quality—filtering, chlorinization, removal of iron, sterilization of bacteria—are basic requirements that should be incorporated in such projects to ensure that the facilities are not abandoned.

66. There should be adequate community participation at all stages of the project cycle.

67. A "total basin approach" should be followed in selecting the type of facility. In places where abundant surface water and shallow groundwater are available, the preference for deep wells should be justified by prior hydrogeological surveys and analyses of water availability and potential in the areas. The expansion of sources with overhead tanks and pipes must be justified by adequate water availability and institutional capacity. Community-level user groups are ill equipped to handle the O&M of systems with public and private taps immediately after the

completion of facilities. Government agencies concerned should engage in active training and technology transfer. There should be a clear delineation of roles and responsibilities when problems occur.

68. Forming community-level water users associations (such as the BWSAs) and building capacity for improving the BWSAs' skills should precede the actual construction of the facility. The handing over of the facility to the community should be supported by a "successful test of sustainability" for financial and technical aspects for at least one year. Community organizations responsible for the O&M of projects in the rural water supply sector should first be legally constituted and registered. The tariff collection should be regular, and tariff levels should be set according to the level of service and cover expenses for regular and periodic maintenance. This is a prerequisite for the sustainability of the facilities.

69. The environmental aspects of projects should be prominent in the design. ADB should review concomitantly sanitation facilities in project areas. Where there is no justification for constructing sewerage systems and sustainably operating these, conventional pit latrines should be encouraged. When septic tanks are encouraged, the impact on shallow groundwater sources—their future availability and water quality—should be analyzed and assessed. Specific medium- and long-term programs for disposal of human waste should also be prepared and implemented. In this Project, the proliferation of septic tanks and their impact on the shallow groundwater was completely overlooked. Specific guidelines on locating and constructing septic tanks are necessary. Competent authorities should supervise septic tanks construction to ensure that groundwater is not polluted.

C. Follow-Up Actions

1. For the Borrower

70. The Mission prepared a list of specific recommendations on the sites visited (Appendix 12). The Mission's general suggestions are summarized in the following list:

(i) The district and municipal agencies should establish laboratories with kits and reagents for water quality testing; these facilities should be easily accessible to the BWSAs. The BWSAs are recommended to test water quality at least twice a year.

(ii) Basic water treatment for removing dissolved iron and sterilizing against coliform bacteria should be introduced at all facilities. The BWSAs should undergo training and acquire relevant kits as soon as possible.

(iii) For future projects, the siting and type of facility should be decided after rigorous analyses of groundwater and surface water availability, quality, and sociocultural acceptability. Moreover, this exercise should be accomplished with the participation of the beneficiaries. The least-cost analysis should consider the risks of poor maintenance. Moreover, a demand analysis is necessary to include options for expanding services after a few years of operation to meet future demand. The impact of excessive use of groundwater in the coastal areas should not be overlooked while siting the facility.

(iv) The BWSAs should be legally registered and formally required to operate funds through accounts. DILG and the DEOs should provide necessary training on bookkeeping.

(v) The BWSAs should set tariffs pegged to the level of service (e.g., level I, P20/household/month and level II, P40/household/month); and collect these tariffs when the facilities begin to operate. The BWSAs need to accumulate buffer funds against the future costs of replacing pumps and parts (e.g., P5,000 for level I systems and P60,000 for level II systems).[1] The BWSAs should also continue collecting tariffs and using amounts in excess of the buffer funds for regular O&M work.

(vi) Community-level training and campaigns on public health, hygiene, operation of hand pumps, and dry wells should be urgently conducted. DOH, with the cooperation of DILG, should train barangay officials and BWSA officers to do such training for the community.

(vii) DPWH and DILG should, as a priority and before embarking on constructing new facilities, review the nonoperating facilities and rehabilitate them to ensure sustainable developmental impact, including:

(a) repairing physically damaged structures,

(b) analyzing water quality for abandoned facilities and introducing water treatment for remediable cases,

(c) strengthening the BWSAs to operate in a financially sustainable manner by encouraging them to collect tariffs to cover regular O&M expenses, and

(d) providing other training and support as mentioned in (ii) and (iii).

(viii) DILG (in cooperation with the municipal-level agencies concerned) is advised to urgently review and assess the groundwater and surface water availability in catchments and basins and evaluate the sustainability at the level of abstraction from the project facilities. This effort should also cover plantations in upper watersheds, and siltation in downstream water courses.

(ix) Appropriate standards and guidelines for O&M of small-scale, community-based rural water supply systems, covering technical, institutional, and social problems, should be prepared and widely disseminated.

[1] The figures recommended for the buffer fund are based on collections during the first 24 months of operation when major repair in a new installation is unlikely. An average of 10 households for level I systems and an average of 60 households for level II systems were used per facility.

2. For ADB

71. Learning from the lessons of the first project and the Project, ADB should review the approach to future projects in the rural water supply sector. The major recommendations are summarized as follows:

(i) Aid donors should consider providing TA to assist the Government in implementing recommendations in (i), (ii), (vi), (vii), and (viii) in para. 70.

(ii) Aid donors should consider supporting the Government in preparing appropriate programs to locate and construct septic tanks in rural areas and to properly dispose of human waste (Appendix 10).

(iii) In the coastal areas, ADB should carefully review the justification for upgrading deep wells into level II systems and the impact of overabstraction on water quality.

(iv) Mandatory requirements for the municipal engineer offices and/or the executing agency, or a similar repository of expertise at the district level should be built into the Project to provide technical assessments for items such as water sources available, and quality control of concrete works.

(v) The executing agency should undertake periodic maintenance in cases where the community or the BWSA is judged incapable. The project should include an O&M component for this purpose to ensure that the facilities are not abandoned.

D. Action Plan and Final Rating

72. ADB's Projects Division and the Government (DILG, DOH, and DPWH) adopted an action plan (proposed by the Mission) for rehabilitating the facilities and strengthening the BWSAs (Appendix 13). The Mission considered the sustainability of the Project to be likely after these actions are substantially completed.[2] ADB's Projects Division committed to holding senior-level consultations with the Government on the action plan, including any changes in scope for the ongoing RWSSP (footnote 6) to provide adequate resources to implement the action plan. Acknowledging the commitment of ADB's Projects Division and the Government to implement the action plan, the Project is, therefore, rated partly successful.

[2] The action plan was discussed and adopted at a meeting at ADB headquarters on 7 October 1999.

APPENDIXES

LESSONS LEARNED FROM PARTICIPATORY EVALUATION AND RECOMMENDATIONS FOR REHABILITATING NONOPERATING FACILITIES

A. General

1. The nearly 2 million project beneficiaries were rural people scattered around the 15 island provinces for whom easy access to safe water was to be provided. Betterment of public health through a corresponding reduction in the incidence of water-borne diseases and improvement in the well-being of the beneficiaries was the main justification for the Project. Availability of water in the quantities required was not a major constraint for this Project, but the poor water quality must be addressed.

B. Water Availability

2. Some project facilities have been abandoned due to declining quantity and quality of water. In some areas, seasonal variation in shallow groundwater levels cause the facilities to dry. This in itself can be viewed as a seasonal inconvenience, but the root causes in relation to the project implementation raise serious questions. The consultants appointed for the Project were required to carry out technical appraisals of facilities. These appraisals should have entailed assessing both surface water and groundwater resources to reach decisions on whether a shallow or a deep borehole was required for a location. The lesson here is that the failure of shallow wells (boreholes) is clear evidence that such appraisals were not done properly if at all.

C. Water Quality

3. Some hand pumps were abandoned due to water quality problems, such as unpalatable taste, odors, and dissolved iron. Since the facilities were handed over, the water quality has generally deteriorated. The dissolved iron may have not been so noticeable at the beginning but is usually associated with the in-situ presence of iron compounds in the soil layers. Simple community-level treatment for reducing iron content would have been adequate to ensure that facilities are not abandoned due to remedial procedures. This involves simple aeration of the water, which causes the dissolved oxygen to form oxides that are solids. The precipitated solids are then filtered through sand, resulting in the dissolved iron being removed. Philippine national standards for water supplies defined acceptable levels of various contaminants, including iron. However, the deterioration of the taste can usually be attributed to a range of materials from organic phenyl compounds in trace concentrations to effluent from leakage of septic tanks. In the case of the project sites visited, the likely cause is leakage from septic tanks, which were found to be within a few meters of the shallow wells (even in disregard of the basic tenet of a minimum of 25 meters). The principal lesson here is that the institutions that are capable of providing simple, village-level treatment solutions for problems such as iron removal and sterilization of bacteria-contaminated waters using hypochlorite, have not been required to produce such solutions and disseminate such knowledge.

D. Strengthening *Barangay* Waterworks and Sanitation Association

4. Institution building at the *Barangay*[1] Waterworks and Sanitation Association (BWSA) level was accomplished, although incompletely. The BWSAs were created to ensure that there will be community-level organizations with a focus on water and sanitation to own and take

[1] Neighborhood

responsibility for running the project facilities. A major part of the BWSA tasks was to carry out their own operation and maintenance through collection of tariffs. However, many BWSAs do not operate as intended. This in itself is self-defeating, as many BWSAs do not have funds to carry out their repairs when required. The approach seems to be one of "crisis management" as and when breakdowns occur. The BWSAs were either not given clear institutional guidelines on their financial responsibilities in collecting tariffs for the purposes of becoming self-supporting, or they were not conforming to the guidelines. Moreover, BWSAs were not required to collect tariffs from their members at fixed minimum rates (depending on, for example, for level I, ₱5,000 and for level II services ₱60,000).[2] Equally important, BWSAs were not required to operate their finances through banking accounts. These two factors, in combination, caused serious problems for the operation of project facilities.

5. To enable future projects to be truly owned and operated by the BWSAs, two conditions must be met. First, the BWSAs must be required (not only just expected) to be registered as a legally constituted and financially responsible body. Second, the BWSAs should then be legally required to collect tariffs set at minimum levels according to levels of service and maintain these amounts in proper bank accounts with at least two BWSA officials as required signatories for operating the accounts. The BWSAs also must carry out proper bookkeeping.

6. The lesson here is that the BWSAs require clear institutional identity and a mandate to regularly collect tariffs set at a minimum level.

E. Role of the Government Institutions in the Rural Water Supply Sector

7. The policy of the Government to devolve power to the regions has been put in place with a number of administrative guidelines for implementing the devolution. However, at the working level the rural water supply and sanitation sector has suffered in some cases due to the lack of definition of clear boundaries of responsibility between the different institutions that are responsible in part or as a whole. One case is the facility in *Barangay* (footnote 1) San Miguel in Jordan, Guimaras. This level III system supplies 150 households and a number of institutional consumers in the town. The only electrical submersible pump at the main intake site at Balading Spring broke down five years ago. The BWSA tried to repair the pump and later tried to replace it with a gasoline-driven pump, which also failed. This process consumed all of the ₱70,000 savings of the BWSA. Now for the past five years, the BWSA has had no financial means to resolve the issue. Apparently, when the BWSA members approached the Department of Public Works and Highways (DPWH), they were told that DPWH was no longer responsible to attend to the repair as the project facilities was formally handed over upon completion to the BWSA, and the Department of Interior and Local Government (DILG) is said to have had no specialists who could attend to the repair of this pump.

8. The lesson learned here shows a lack of any mechanism for the coordination between different institutions at the operational level. This is seen as a shortcoming that needs to be rectified. Suggested actions would be for formal arrangements to be made by the central Government to require the lending of support at the operational level between institutions and interrelated agencies, such as DPWH, DILG, the Department of Health (DOH), and the municipal government offices. The reasoning behind this is that if there are institutions (such as the DPWH) that have the expertise and extensive experience with water supply pumps, then it

[2] The figures recommended for the buffer are based on the first 24-month period of collection as any major repair is unlikely in a new installation in that period. For level I, an average of 10 households and for level II, an average of 60 households were used per facility.

does not make sense economically to disallow them from assisting in a case such as the one in Jordan.

F. Environmental Concerns

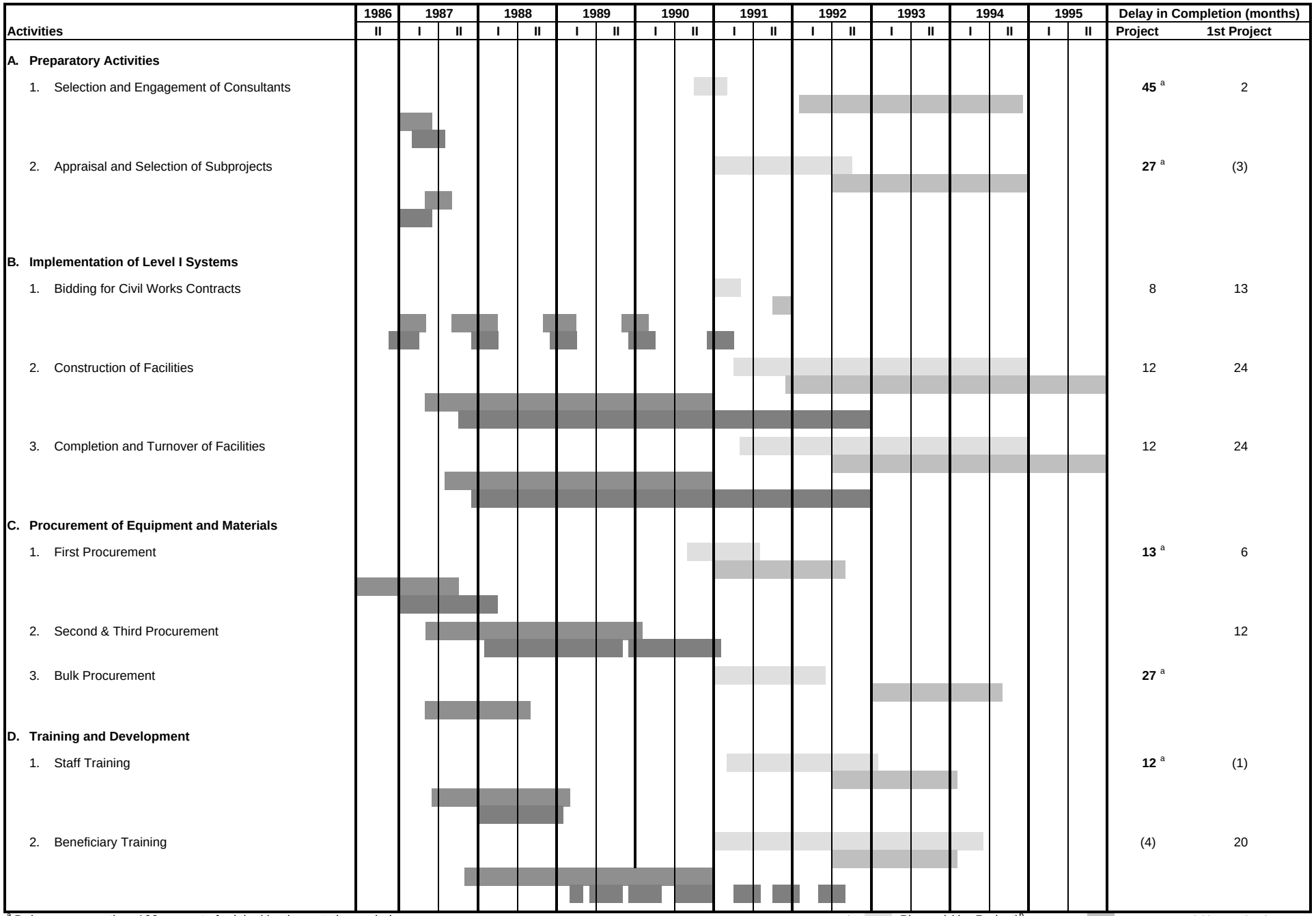
9. Awareness of environmental issues is seen to be lacking in the communities where the BWSAs are located. A case in point is the spring-based water supplies for *Barangay* Caradio-an near Himamaylan in Negros Occidental II. There, the level II[3] water supplies are sourced from four separate springs in the same vicinity at the foot of a hill. This same spring source has been used by the community for more than 30 years. The facility was constructed five years ago, and the BWSA has noticed progressively declining available flows in the water supply over the past four years. The most relevant and clear cause for this is the dense plantations of mahogany and eucalyptus trees covering the hill where the spring is, and the hills upstream of the spring. These plantations are privately owned and were planted only five years ago. The lesson learned here is that if the community members were aware of the need for protecting their environment, they may have been able to have a say before the plantations were started.

G. Public Health

10. The random water samples taken as part of the field survey and also during the Operations Evaluation Mission contained, almost without exception, unacceptable levels of coliform bacteria. As all the shallow wells and deep wells are sealed from direct surface contamination, the only valid inference is that the groundwater itself is polluted with coliform bacteria, leaking from the ubiquitous septic tanks. Many wells have been recorded as abandoned due to bad taste or odors and these are usually associated with septic tank leakage. The water from these wells could have been made potable using simple chlorination methods, rather than the facilities being abandoned. The lesson learned here is that the members of rural communities would benefit from learning the basics of public health and the cause and effect relationships of pollution as it affects their own health. The project completion report refers to a lack of drainage around standpipes, but this in itself poses little threat to contamination of the groundwater compared with septic tank leakage. Of course, standpipe platforms should be kept free of stagnant wastewater.

[3] Level II systems have a mix of public standpipes and household connections.

IMPLEMENTATION SCHEDULE



[a] Delay was more than 100 percent of original implementation period.

[b] Loan 1052-PHI(SF): *Second Island Provinces Rural Water Supply Sector Project*, for $24 million, approved on 20 November 1990.

[c] Loan 812-PHI: *Island Provinces Rural Water Supply Sector Project*, for $24 million, approved on 4 December 1986.

Legend: Planned (the Project)[b] — Actual (the Project); Planned (first project)[c] — Actual (first project)

FIRST AND SECOND ISLAND PROVINCES RURAL WATER SUPPLY SECTOR PROJECTS: COMPARISON OF PROJECT COSTS

Item	Amount ($ million)			Percent Share (%)		
	Second Project		First Project	Second Project		First Project
	Appraisal	Actual	Actual	Appraisal	Actual	Actual
A. Base Cost	30.8	26.2	29.0	98.4	98.7	91.3
1. Civil Works	13.8	15.1	13.8	44.1	57.1	43.4
2. Equipment and Materials	14.8	8.8	13.4	47.3	33.2	42.2
3. Consulting Services	1.3	1.0	1.3	4.2	3.6	4.2
4. Institutional and Administrative Support	0.6	1.3	0.5	1.9	**4.8** [a]	1.5
5. Land Acquisition	0.3	0.0	[b]	1.0	0.0	[b]
B. Service Charge During Construction	0.5	0.4	2.8	1.6	1.3	8.7
Total Project Cost	**31.3**	**26.5**	**31.7**	**100.0**	**100.0**	**100.0**

[a] 100 percent overrun on institutional and administrative support

[b] Actual costs cannot be accurately determined.

DISTRIBUTION OF WATER SUPPLY SYSTEMS: NUMBER OF SUBPROJECTS

	Appraisal				Actual			
	New		Rehabilitation[a]		New		Rehabilitation	
Island Province	DW	SW	SD	Wells	DW	SW	SD	Wells
Basilan	35	175	10	20	59	39	27	22
Batanes	42	0	5	5	0	0	10	0
Camiguin	18	20	10	10	0	0	31	5
Catanduanes	23	40	20	15	137	216	11	17
Guimaras	42	0	5	10	99	28	6	47
Marinduque	16	40	10	15	62	61	12	20
Masbate	716	264	25	70	328	385	16	53
Negros Occidental	767	1,905	71	115	1,249	1,692	82	450
Negros Oriental	195	225	25	30	171	280	15	24
Quezon	410	850	54	90	279	452	27	45
Romblon	195	155	20	25	357	246	52	58
Siquijor	42	0	5	10	47	0	7	21
Sulu	355	170	10	35	234	264	12	37
Surigao del Norte	34	56	20	30	88	88	32	27
Tawi Tawi	110	100	10	20	52	107	7	11
Total	**3,000**	**4,000**	**300**	**500**	**3,162**	**3,858**	**347**	**837**
Grand Total				**7,800**				**8,215**[b]

DW = deep well, SD = spring development, SW = shallow well

[a] Includes facilities originally built by the Government with other funding. It is not clear (not reported) how many of these were funded by the first project (Loan 812-PHI: *Island Provinces Rural Water Supply Sector Project* , for $24 million, approved on 4 December 1986). The Mission identified 1 facility out of the 92 rehabilitated facilities built under the first project facilities surveyed.

[b] Includes 11 rain collectors in Romblon.

WATER QUALITY ANALYSIS

Province	Municipality or City	*Barangay*[a]	Purok[b]	Facility	Usage	Test Results	
						Bacteriological	Physical and Chemical
Negros Oriental	Sibulan	Magatas		DW	For drinking	Fecal coliform	
		Magatas		Spring	For drinking	Fecal coliform	
		Magatas		DW	For drinking	Coliform	
		Calabnugan		DW	For drinking	Fecal Coliform	
		Agan-an		SW	Not for drinking	Fecal Coliform	
Romblon	Ferrol	Tubigan	Landing	DW	Not for drinking	Coliform	
	Odiongan	Batiano		Spring	For drinking	Fecal Coliform	
Negros Occidental	Bacolod City	Taculing		DW	For drinking	Fecal Coliform	Exceeded Iron and Manganese BFAD standard
		Vista Alegre	Katilingban	DW	For drinking	Meets DOH standard	Exceeded Iron and Manganese BFAD standard
		Paglaum Village	Margarita	DW	For drinking	Meets DOH standard	Exceeded Iron BFAD std.

BFAD = Bureau of Food and Drug Administration, DOH = Department of Health, DW = deep well, SW = shallow well

[a] Neighborhood

[b] spot

ECONOMIC INTERNAL RATE OF RETURN

Item	Unit/Value	Value for All Types	Spring	Shallow Well	Deep Well
A. Basic Information					
1. Households Served	no.		207	30	96
2. Present Consumption Without the Project	lpcd		40	40	40
3. Average Household Size	no.		5.5	5.5	5.5
B. Current Water Consumption					
1. Consumption per Household	m^3/yr		80	80	80
2. Total Current Water Consumption	m^3/yr		16,622	2,409	7,709
C. Future Water Demand Served by the Project					
1. Average Consumption per Household	lpd		250	250	250
2. Average Consumption per Year	m^3/yr		91.25	91.25	91.25
3. Total Future Water Demand Served by the Project	m^3/yr		18,889	2,738	8,760
4. Nonincremental Demand Served by the Project	m^3/yr		16,622	2,409	7,709
5. Incremental Demand Served by the Project	m^3/yr		2,267	329	1,051
D. Costs of Water Supply Projects					
1. Financial Price of Investment	₱		180,000	45,000	75,000
Annual operation and maintenance (O&M) Costs	₱		24,840	21,000	96,768
2. Economic Price of Investment	₱		173,880	43,470	72,450
Annual O&M Cost	₱		19,922	16,842	77,608
C. Benefits					
1. Cost Savings for Nonincremental Demand					
a. Volume			16,622	2,409	7,709
b. Value of Time	180 /day	14.63 per hour			
c. Time for Fetching 220 l/day	min		120	60	30
d. Average Distance to Source	km		3	1	0.5
e. Total Nonincremental Benefits	₱		2,209,984	160,144	256,230
2. Incremental Part					
a. Supply Price Without the Project	₱/m^3		133	66	33
b. With the Project Time for Fetching	min		5	3	2
(i) Distance	m		20	150	10
(ii) Amount of Water Fetched		20 l			
c. Time Consumed for Fetching 250 l/day	min		62.5	37.5	25
d. Value of Time	₱/m^3		93.75	56.25	37.5
e. O&M Costs	₱/m^4		1.32	7.67	11.05
f. Total Cost of Supply	₱/m^5		95.07	63.92	48.55
g. Average Demand Price	₱/m^6		114.01	65.20	40.89
h. Value of Benefits	₱		258,420	21,418	42,986

l = liter, lpcd = liter per capita per day, lpd = liter per day, m^3 = cubic meter, min = minute, yr = year

ECONOMIC INTERNAL RATE OF RETURN (Continued)

Item	Unit/Value	Value for All Types	Spring	Shallow Well	Deep Well
D. EIRR Calculations					
1. Investment (Economic)	₱		173,880	43,470	72,450
2. O&M Costs (Annual)	₱		19,922	16,842	77,608
3. Benefits	₱		697,583	27,577	(29,284)
a. Total Benefits	₱		697,583	27,577	(29,284)
b. Nonincremental	₱		2,209,984	160,144	256,230
c. Incremental	₱		258,420	21,418	42,986
d. Less: Value of Time for Fetching With the Project[a]	₱		(1,770,820)	(153,984)	(328,500)
e. Life	number of years		15	10	15
EIRR for Normal Life			**62%**	**20%**	**negative**
Sensitivity Analysis: When the Facility Stops Operating After 3 Years			**16%**	**negative**	**negative**
E. Conversion Factors					
For Converting Financial Prices to Economic Prices					
Investment		0.966			
O&M Cost		0.802			
1. % of Traded Goods					
a. In Investment	60%	1.06			
b. In O&M	20%				
2. % of Labor					
a. In Investment	20%	0.65			
b. In O&M	60%				

[a] The tariff is not collected regularly. Moreover, it is very low and does not reflect the economic cost of providing the facilities. Thus, the average value of time spent in collecting the water is subtracted from the benefits.

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(in Pesos)

Year	SPRING DEVELOPMENT					SHALLOW WELL					DEEP WELL				
	Investment	O&M	Total Cost	Gross Benefits	Net Benefits	Investment	O&M	Total Cost	Gross Benefits	Net Benefits	Investment	O&M	Total Cost	Gross Benefits	Net Benefits
1	1,000,000		1,000,000		-1,000,000	43,470		43,470		-43,470	72,450		72,450		-72,450
2		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
3		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
4		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
5		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
6		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
7		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
8		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
9		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
10		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
11		77,000	77,000	697,583	620,583							77,608	77,608	-29,284	-106,892
12		77,000	77,000	697,583	620,583							77,608	77,608	-29,284	-106,892
13		77,000	77,000	697,583	620,583							77,608	77,608	-29,284	-106,892
14		77,000	77,000	697,583	620,583							77,608	77,608	-29,284	-106,892
15		77,000	77,000	697,583	620,583							77,608	77,608	-29,284	-106,892
NPV					**3,246,949**					**7,995**					**(781,716)**
EIRR					**62%**					**20%**					**negative**

Numbers Used in Loan No. 1440/1441(SF)-PHI

	investment	O&M	Other costs
spring	289,744	36,000	1,000
deep well	119,416	36,000	1,000
shallow	31,830	36,000	1,000

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Assumption: Project facility stops operating after three years.

(in Pesos)

	SPRING DEVELOPMENT					SHALLOW WELL					DEEP WELL				
Year	**Investment**	**O&M**	**Total Cost**	**Gross Benefits**	**Net Benefits**	**Investment**	**O&M**	**Total Cost**	**Gross Benefits**	**Net Benefits**	**Investment**	**O&M**	**Total Cost**	**Gross Benefits**	**Net Benefits**
1	1,000,000		1,000,000		-1,000,000	43,470		43,470		-43,470	72,450		72,450		-72,450
2		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
3		77,000	77,000	697,583	620,583		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
NPV					**70,041**					**(22,580)**					**(234,513)**
EIRR					**16%**					**negative**					**negative**

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(in Pesos)

	SPRING DEVELOPMENT					SHALLOW WELL					DEEP WELL				
Year	**Investment**	**O&M**	**Total Cost**	**Gross Benefits**	**Net Benefits**	**Investment**	**O&M**	**Total Cost**	**Gross Benefits**	**Net Benefits**	**Investment**	**O&M**	**Total Cost**	**Gross Benefits**	**Net Benefits**
1	173,880		173880		-173880	43,470		43,470		-43470	72,450		72450		-72450
2		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
3		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
4		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
5		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
6		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
7		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
8		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
9		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
10		19,922	19,922	697,583	677,662		16,842	16,842	27,577	10,735		77,608	77,608	-29,284	-106,892
11		19,922	19,922	697,583	677,662							77,608	77,608	-29,284	-106,892
12		19,922	19,922	697,583	677,662							77,608	77,608	-29,284	-106,892
13		19,922	19,922	697,583	677,662							77,608	77,608	-29,284	-106,892
14		19,922	19,922	697,583	677,662							77,608	77,608	-29,284	-106,892
15		19,922	19,922	697,583	677,662							77,608	77,608	-29,284	-106,892
NPV					**4,380,220**					**7,995**					**(781,716)**
EIRR					**390%**					**20%**					**negative**

RESULTS OF THE SOCIOECONOMIC SURVEY

A. Background

1. The Mission fielded a socioeconomic survey in April 1999. The objectives of the survey were to (i) provide information on parameters stipulated in the loan covenants, (ii) determine the extent of the impact of the Project on its targeted beneficiaries, and (iii) validate the results of the survey conducted at the time of the project completion report.

B. Methodology

1. Scope

2. The survey covered the sociocultural and economic aspects of the project beneficiaries. Specifically, the survey tried to determine the impact of the Project's technical aspects and institutional and financial arrangements on the beneficiaries' welfare, standard of living, and health.

3. The survey also tried to determine the extent to which the Project achieved its main objective, i.e., to provide rural communities in 15 island provinces[1] with easily accessible and safe drinking water.

2. Survey Format and Procedures

4. The survey team comprised the social sector specialist/local consultant and three Manila-based coordinators. The survey team was assisted by the respective district engineer's offices (DEOs) of the Department of Public Works and Highways (DPWH) in the field.

3. Role of Coordinators

5. In contrast to the survey done during the project completion report where the enumerators were hired and guided directly by the project implementors in the field, coordinators and enumerators were hired from Manila to undertake the field survey to rule out possible "stakeholder biases" that could affect the survey results.

6. For Negros Occidental, where more than 42 percent of the Project was implemented, the coordinator selected enumerators from the National Statistics Office to cover the target survey sample size of 60 within the allotted period for the survey. The coordinators (i) checked the completeness and consistency of data gathered, and (ii) completed the tabulation and summarization of data.

4. Criteria for Site Selection

7. Given the limited amount of time for the survey, the sites were chosen considering their accessibility and security risks. Basilan, Masbate, Sulu, and Tawi Tawi were excluded due to security risks.

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[1] The 15 provinces were Basilan, Batanes, Camiguin, Catanduanes, Guimaras, Marinduque, Masbate, Negros Occidental, Negros Oriental, Quezon, Romblon, Siquijor, Sulu, Surigao del Norte, and Tawi Tawi.

8. In terms of accessibility, the sites were categorized as (i) first priority: with regular flight schedule from Manila and convenient sea travel; (ii) second priority: with regular flight schedule from Manila but irregular sea ferry schedule; and (iii) third priority: far from an airport (or no regular flight schedule) and sea travel necessary. The final criterion for selection was the number of facilities constructed in the area. Table A8.1 provides the ranking according to the number of facilities constructed.

Table A8.1: Selection of Sample Sites

	Prioritization According To			
Province[a]	**Accessibility**[b]	**Facilities Constructed** (no.)	**Preference**	**Samples** (no.)
Batanes	3	11	Not preferred	
Camiguin	3	10	Not preferred	
Catanduanes	2	5	Not preferred	
Guimaras	1	7	Preferred	3
Marinduque	1	8	Preferred	12
Negros Occidental	1	1	Preferred	49
Negros Oriental	1	4	Preferred	16
Quezon (Alabat, Polillo Islands)	2	2	Not preferred	
Romblon	1	3	Preferred	9
Siquijor	1	9	Preferred	3
Surigao del Norte	2	6	Not preferred	

[a] Excludes security risk provinces.
[b] Ranked as 1 = first, 2 = second, 3 = third, 4 = fourth = 5 = fifth, 6 = sixth, 7 = seventh, 8 = eighth, 9 = ninth, 10 = tenth, 11 = eleventh

9. After applying the criteria for site selection, provinces covered by the survey included Guimaras, Marinduque, Negros Occidental, Negros Oriental, Siquijor, and Romblon.

10. Within the provinces, the survey team had relied on the assistance of DPWH staff in identifying the individual sites.

11. The Operations Evaluation Mission also visited sites in Guimaras and Negros Occidental. The Mission invited stakeholders from other areas to attend the self-esteem, associative strength, resourcefulness, action planning, responsibility (SARAR) workshop held in Bacolod City. As the SARAR workshop was a participatory monitoring and evaluation forum, the discussion outputs were used by the Mission to supplement and validate the data gathered during the survey.

5. Surveyed Sites

12. The sample size was estimated using Tsebychev's Inequality. Given the total population of 8,205, for a margin of error of 10 percent, the survey required 100 samples. The number of samples in each province was prorated according to the respective number of facilities constructed. Distribution of samples by province is shown in Table A8.1. Selected provinces were divided into two groups for purposes of assigning these to the two coordinators.

13. Finally, 92 sites in the provinces of Guimaras, Marinduque, Negros Occidental (including Bacolod City), Negros Oriental, Romblon, and Siquijor were covered.

14. Of the 92 sites surveyed, 89 percent involved new construction while 1 percent involved, rehabilitation of nonfunctioning deep wells, and 2 percent involved additional improvements on existing facilities. Of the newly constructed facilities that were surveyed, 71.9 percent were deep wells, 13.5 percent shallow wells, 11.2 percent spring development facilities, and 3.4 percent free-flowing wells.

15. The survey team faced other constraints.

(i) **Inclement Weather.** The sites located in distant *barangays*,[2] particularly around the sugarcane fields in Negros Occidental, were inaccessible due to heavy rains that made gravel roads muddy and impassable. In Negros Oriental, rainy weather caused a river to overflow, stranding the survey team in a *barangay* until dark, limiting movement to reach the number of sites targeted to be covered for the day.

(ii) **Lack of DPWH Personnel to Guide the Survey Team.** The timing of the ADB survey coincided with the arrival of the DPWH monitoring audit team from the central office.[3] As the key persons (the water supply engineers) were unavailable, water supply drillers or other personnel accompanied the survey team. Furthermore, DPWH water supply engineer and training officers involved in the project implementation had been assigned to other units in the DEOs because of the devolution of implementation of levels I and II water supply facilities to the local government units (LGUs) and the Department of Interior and Local Government. Except for the provinces of Guimaras and Romblon, the other provinces visited have no continuing program for water supply in the DEOs. Monitoring of water supply facilities has also been devolved to the LGUs as DPWH has no more budget, personnel, or other resources for this activity.

C. Water Quality Analysis

16. Water quality testing for potability and for physical and chemical characteristics was done at the National Sciences Research Institute and the University of the Philippines. Ten randomly selected samples (three from Negros Occidental, five from Negros Oriental, and two from Romblon) were tested for potability. The three water samples from Negros Occidental were also tested for physical and chemical characteristics. The bacteriological tests showed that of the 10 water samples, only 2 met the DOH standard.[4] Eight were found to be positive with coliform bacteria of which six had fecal coliform bacteria. Of the eight samples found positive for coliform, six were used for drinking, while of the six samples found positive for fecal coliform, five were used for drinking. Although the beneficiaries drink from these sources, there were no reported cases of water-borne illnesses. The physical and chemical tests, on the other hand, showed that the three samples exceeded the Bureau of Food and Drug's guide level for iron

[2] Neighborhoods

[3] The lack of advance information from the central office to the district engineer's offices about the arrival of the survey team delayed mobilization of personnel and preparation. Consequently, many sites near the district engineer's offices were chosen.

[4] According to the Department of Health's quality standard, coliform bacteria should be less than 2.2 (most probable number) per 100 ml.

content of 0.3 milligrams/liter while two exceeded the guide level for manganese content of 0.05 milligrams/liter.

1. Perception of Water Quality and Health Impacts

17. Testing of the water quality was not done regularly for most of the sites. Only 20 percent of the surveyed facilities were found to be tested regularly, from annually to monthly or fortnightly. Despite the mandatory requirement for testing upon turnover, only 39 percent of the facilities were tested at that time.

18. In most of the places surveyed, the communities drink the water as long as the water has no color, does not produce stains on laundry and is not muddy or unclear. The potability of the water was gauged on whether the community members became ill from drinking from a particular facility.

19. In one case in Marinduque, the people only stopped drinking from the deep well when some of them became sick with typhoid fever, resulting in the hospitalization of the children of one family and the death of the mother. The *barangay* health unit tested the water and other water sources within the area after this incident and found that the source was not fit for drinking.

20. In *Barangay* Agan-an, Sibulan, Negros Oriental, the people stopped drinking from a shallow well when the source was found to be contaminated. The sanitary inspector advised them to extend the canal away from the source, but after another test, the water was still contaminated. The same source was tested by the survey team and found to be positive for fecal coliform bacteria.

D. Socioeconomic Impacts

1. Water Usage and Coverage

21. As to the objective of providing safe drinking water, about 30 percent of the households surveyed indicated that the water they get from the facility provided by the Project was not used for drinking due to poor water quality. They have other sources of drinking water. Of the remaining households who use the facilities for drinking, about 2 percent indicated that they used the water exclusively for drinking, conserving its use.

22. Eleven percent of the sites were not used, and 29 percent of the facilities were not used for drinking for reasons including the following: (i) the water became cloudy after one year of operation; (ii) the municipal or *barangay* health officer informed the people that the water was not fit for drinking; (iii) the water had high iron content, bad odor or smelled like fish, or floating sediments (including red worms); and (iv) a better source that was more accessible or had better water quality (usually from a spring source) was provided by the local government within the past two or three years.

2. Convenience

23. In terms of accessibility, the communities had no complaints about the distance between their homes and the facility. The beneficiaries reported that the project facilities provided them with accessible water supplies. In the spring facilities, where time savings were substantial, beneficiaries used the extra available time for economically productive activities (such as

working in the fields, raising livestock and vegetables, and growing orchids), leisure, and rest. Their children also helped them fetch water and do other household chores.

24. All operating facilities were used for all originally intended purposes except for drinking. However, in places where another source facility was constructed at a location more convenient than the project facility, the people minimized the use of the latter.

E. Institutional Impact

1. *Barangay* Waterworks and Sanitation Association Formation

25. Barangay Waterworks and Sanitation Associations (BWSAs) were formed at 60 percent of the sites. However, the Mission found the BWSAs to be managing and operating only 28 percent of the facilities. The *barangay* government units were operating 33 percent, and the users were managing another 13 percent.

26. Six percent of the facilities were jointly operated and managed by the BWSA and users (3 percent), *barangay* government and users (1 percent), and the BWSA and *barangay* government (2 percent).

2. Water Fee Collection

27. Water fees were collected regularly at only 28 percent of the facilities, which are mostly water facilities that have been upgraded with household connections. However, of the sites without regular water fee collection (45 percent), the expenses for repairs were usually divided equally among the users as needed.

F. Impact on Women

28. Water fetchers were 58 percent among the adults and 40 percent among the children. The woman and the man in a household were found to be taking equal turns in fetching water. For the children, water fetching was also equally divided between the male and female children.

29. In many households surveyed, fetching water is assigned to the able-bodied regardless of gender, particularly in households where grandparents live with their grandchildren. In some households, the male adult fetches water more often than the female adult, who is often doing work around the home or caring for children.

30. In many areas, women had leadership roles in water users associations. Women occupied key positions in the BWSAs (such as president, secretary, or treasurer) and in the *barangay* government unit (such as chairperson/captain, council member, or secretary).

G. Recommendations for the Future

1. Proper Design of Facilities

31. However, where poor water quality was not the reason for the diminished usage of the water system, and another source was found more useful, some rethinking of planning design might be in order. The Project provided level I facilities. However, the design of such facilities did not adequately address the growing and changing demands of the population. The shallow and deep well facilities could not accommodate future expansion to level II or III due to the

limited capacity of the source; only spring sources are easily upgraded to levels II or III. The free flow facilities (such as in Marinduque), should have been provided with storage tanks and limit valves at the outlet, and users could have upgraded the facilities with their own distribution pipes. After a few years when water was practically wasted, most of these free flow facilities have limited or no supply.

2. Operation and Maintenance of the Facilities

32. The original concept of the Project was to form the BWSAs for the operation and maintenance (O&M) of the facilities. Although the BWSAs were formed in many cases prior to or during the turnover of the facilities to the beneficiaries, many BWSAs could not handle the operation and maintenance of the facility efficiently.

33. In some places, such as in Siquijor, the BWSAs were transformed into cooperatives, which enabled the associations to obtain loans from banks. These loans were used for expansion and upgrading of the water systems to level III and for major repairs. In other places, such as Guimaras, the BWSAs (although active) could not cope with the major rehabilitation needed by the system due to a lack of capital or to the inability to access lending institutions directly.

34. The legal nature of the BWSA should be looked into, as the sustainability of the O&M depends on these small private associations. The limitations of the legal personality of the BWSA have far reaching implications on the sustainabililty of existing facilities and those to be built in the future.

35. In some cases, the *barangay* government took over the operation of the facility or provided all types of assistance (including financial) to the BWSA, acknowledging that water is a basic need of the people. There were cases in which a combination of government and stakeholders jointly undertook the O&M. The role of each stakeholder needs to be defined, that is, the extent to which the government should support the facility and the expectations from the users. However, the complete takeover of a facility by government should be avoided, considering the lessons learned from the first project. The government should assist the people in the beneficiary communities to become self-reliant. In this Project, the people have become aware of their roles as major stakeholders of the Project. However, the people experienced various limitations, such as technical know-how, access to capital requirements for major rehabilitation, and access to equipment or tools. Government should provide the initiative to delineate and identify roles and expectations between itself and the users.

3. Health Campaign and Community Awareness Program on Water Quality

36. The people's perception of water quality still hinges on the actual observation of water-borne diseases. For people to have awareness of water quality and its effect on health, health officials at the local and national levels should provide more intensive health campaigns. The people should be made aware of the importance of keeping the surroundings clean and the relationship of clean surroundings with good water quality through relevant campaigns.

4. Water Tariff and Facility Improvement

37. At the sites where the BWSAs were formed, not all required the members or water users to regularly pay the prescribed water fees. In many cases, the members collected fees for the first year of operations, but because there were no repairs at that time, they ceased to collect.

Sometimes, the members were reluctant to pay the prescribed fee, and the water fee collector could not collect anymore. In many cases, the people are willing to contribute equally among themselves only when repairs were needed.

38. The lack of willingness of the beneficiaries to accumulate reserves reflects the lack of awareness of the need to save capital. The people should be made aware that capital to be accumulated is not only for future repairs but for possible expansion/upgrading of the water facility. The government should orient beneficiaries on how to improve water facilities by themselves, such as through expansion and/or improvement of water quality through treatment.

SOUND ENVIRONMENTAL SOLUTIONS TO RURAL SANITATION

1. There is a lack of a holistic and, more importantly, a long-term approach to the entire rural water supply and sanitation sector. The Projects' rural water supply facilities were provided to address immediate shortages of water without much consideration about the long-term implications. In the "with-Project" scenario, more water use was encouraged than in the "without-Project" scenario. Consequently, much larger volumes of wastewater are now generated. Almost simultaneously with the Project, the water-based disposal of human waste through septic tanks was implemented by several agencies. The septic tanks were installed without any control of their sites (in relation to shallow wells and other water sources), construction, or water tightness. These factors have led to constant leakage of septic material, including effluent and coliform bacteria, into the soil and surrounding shallow groundwater. This is a major hazard to the public health of the rural communities that have their water supplies sourced in the same shallow groundwater.

2. The long-term problem of the disposal of human waste remains unattended to. Whatever the capacity of the septic tanks, by definition, the solids that accumulate as sludge cannot be ignored. Once the septic tank becomes full, it must be emptied to make the same capacity available again (or a new septic tank must be built) to take the discharge from a household. Pour-flush toilets usually need to be emptied at least every two years, if not more frequently. On the contrary, a dry pit latrine is expected to receive 0.6 cubic meters of dry waste per person per year, and the household pit latrine is expected to be emptied every two years.

3. Two major issues arise for the medium and long terms. First, plans to deal with the sludge that is accumulating in the septic tanks everywhere must be implemented. In developed countries, it is mandatory to have the sludge removed and disposed of safely in centralized waste disposal facilities, where the sludge is treated. Such plans have not been included in the planning horizon. Dealing with the sludge will require a considerable capital outlay, especially for the operation and maintenance of such facilities. Second, the Government could be overlooking other possibilities for the disposal of human waste by introducing the concept of some form of dry disposal that will produce harmless compost for use in agriculture. Such technologies exist in many developing member countries. Examples are the ventilated improved pit (VIP) toilets and other systems that have anaerobic digestion of human and domestic waste. Small clusters of households could pipe their wastes to a centrally sealed tank that would act as a digestor and produce viable quantities of methane gas for cooking fuel; the sludge and solids are rendered harmless and become compost for agriculture.

SELECTED CASE STUDIES FROM FIELD VISITS

A. *Barangay*[1] Caradio-An, (near Himamaylan) Negros Occidental II

1. General

1. This is a level II system of 16 communal standpipes, with its source in four springs at the foot of a series of hills near the town. The water scheduling at present is for two hours per day. The collection facilities from the source springs are well constructed. The collection chambers have concrete lids, and these are left in place. The Mission felt that for security, the lids should be locked. The community was advised of this issue, and the possible use of steel lids and padlocks was discussed. The main holding tank in which the output from the four springs is collected before being piped under gravity to the town has no practicable manhole. The standard practice of using a hinged, steel-sheet manhole cover with padlock was suggested to the community.

2. Major Problem and Recommended Solution

2. The community members' main concern is the noticeable decrease of their water supplies over the past four years. The community has used the same springs for more than 30 years. The Mission guided the community to determine whether their perception that some illegal tapping of water from the main supply pipe was the actual cause. The outcome of this exercise, was that the community itself recognized that the dense mahogany and eucalyptus plantation planted during the last five years above the spring sites and all over the hills was the most likely cause. The Mission noted that the mahogany trees were spaced using a one-meter by the two-meter grid, and the eucalyptus trees were spaced on a two-meter by two-meter grid. Although this is a private plantation, the community is aware that the plantation directly affects the source. The community may wish to pursue an action to reduce the plantations' impact.

B. *Barangay* Porisima, Municipality of Manapla, Negros Occidental II

1. General

3. This is a level I system constructed in 1994 with a hand pump. The *Barangay* Waterworks and Sanitation Association (BWSA) was collecting tariffs at a minimum of ₱5/household/month.

2. Major Problem and Recommended Solution

4. The Mission found that the hand pump had been abandoned for almost a year. The reason given was that the pump needs to have some small parts replaced. This would have been possible with the funds collected, but the person who held the money in trust absconded with it. For the past year, the BWSA has not wanted to collect any additional funds. The lessons learned here is that the BWSAs must have some recognition as a fully constituted body and that proper banking facilities must be mandatory and operable with a minimum of two signatures. This will ensure that the collective funds are safe and that the service to the community does not suffer.

[1] Neighborhood

C. *Barangay* Punta Salong, Negros Occidental I

1. General

5. This is a level II system serving 65 households. The system has an overhead tank and an electrical submersible pump.

2. Major Problem and Recommended Solution

6. The system has been abandoned for nearly six months because the electricity supply was cut due to nonpayment of a bill of ₱7,080.

7. The community's normal monthly bill has been ₱2,000-₱2,300. The community collected tariffs set to just cover the bill. Their normal supply scheduling is for 3 hours in the morning and 3 hours in the evening. In addition, the overhead tank had not been used for more than one year, and there was a bypass connection that was also used to pump directly for 6 hours per day. The reason stated for not using the tank was that it is open at the top, and the community members felt that this is not hygienic. The solution here is for some action to pay the debt, secure the switchboard, put an insect-proof roof on top of the tank, and install a gate valve on the main outlet pipe from the tank. The switchboard and the gate valve should be locked to prevent unauthorized use. The Mission gave the community sketches to achieve the physical works.

D. *Barangay* San Miguel, Guimaras

1. General

8. This is a town water supply project sourced from a spring. The facility serves 150 households, several institutions, and government establishments. The tariff is ₱60/household/month, plus ₱20 for every additional cubic meter over the minimum. The water was treated with chlorine before delivery.

2. Major Problem and Recommended Solution

9. The only pump at the source broke five years ago and the BWSA spent ₱70,000 from its collections to repair the pump (without success), and then to replace the broken pump with gasoline-powered pump (again without success). The lesson learned here is that the BWSA did not have technical backup to first identify the cause of the breakdown and then to fix it. Funds are still required for a replacement pump to revive the supply system. This is a case of lack of coordination between DPWH and the BWSA to arrive at a solution. This case was discussed at the self-esteem, associative strength, resourcefulness, action planning, responsibility (SARAR) Workshop in Bacolod, and participants from DPWH agreed to help put the facility back into operation.